REP 1995-053

Short-term effects of an inflatable effigy on cormorants at catfish farms

Allen R. Stickley, Jr., Donald F. Mott, and Junior O. King

Abstract In the late winter and early spring of 1991 we evaluated Scarey Man® (an electronically controlled human effigy-type scare device) to determine its effectiveness in reducing double-crested cormorant (*Phalacrocorax auritus*) numbers foraging on catfish (*Ictalurus punctatus*) ponds in Mississippi. We conducted 4 tests in which 6 devices were deployed for 10–19 days. Each test was conducted on a different pair of catfish complexes in which 1 complex served as treatment and the other as control. Deployment of the Scarey Man® devices reduced numbers of cormorants flushed from the complexes protected by this device. At 1 site, however, the reductions were not as great or as lasting probably because of its proximity to a cormorant day roost. Signs of cormorant habituation to Scarey Man® were evident at 3 of the 4 sites. We recommend use of Scarey Man® in addition to harassment patrols at catfish farms where nearly constant patrols are necessary. Cormorant habituation to the devices can probably be blunted somewhat by moving the devices occasionally, modifying their appearance, and by placing them so that birds on the water can only see the devices when they suddenly inflate.

Key words catfish, deterrent, double-crested cormorant, *Ictalurus punctatus*, *Phalacrocorax auritus*

During the last 20 years, aquaculture has burgeoned in the southern United States. In Mississippi, channel catfish (*Ictalurus punctatus*) farming increased from its first commercial pond in 1965 to >41,000 ha in May 1991 (Miss. Coop. Extension Serv. 1991). The increase in commercial catfish complexes in the Delta area of Mississippi has been accompanied by increased wintering populations of double-crested cormorants (*Phalacrocorax auritus*; National Audubon Soc. 1970–1987). Increased cormorant numbers have led to a corresponding increase in predation at many catfish ponds in the Mississippi Delta (Stickley and Andrews 1989).

A variety of devices and techniques have been used to reduce problems associated with fish-eating birds (Mott 1978, Salmon and Conte 1981). Except for techniques that result in complete coverage of small water areas, however, little information is available on the effectiveness of these methods. Stationary scaring devices such as propane cannons, scarecrows, and old vehicles placed in strategic locations reduce damage only temporarily (Feare 1988, Littauer 1990). Although expensive and sometimes ineffective (Littauer 1990), the most widely used method is the harassment patrol, in which the driver of a vehicle fires pyrotechnics or live ammunition at cormorants.

We evaluated an electronically controlled effigy scare device (Fig. 1) called the "Scarey Man® Fall Guy" (R. Royal, P.O. Box 108, Midnight, MS 39115—reference to trade names does not imply U.S. Government endorsement of commercial products) to determine its effectiveness for 10–19 day trials in reducing double-crested cormorant depredations on catfish ponds. This device was evaluated because of initial success in limited field trials (G. A. Littauer, U.S. Department of Agric., Anim. and Plant Health

Address for authors at the time of the study: U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Mississippi Research Station, P.O. Drawer 6099, Mississippi State, MS 39762, USA. Junior O. King's present address: U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Olympia Research Station, 1835 Black Lake Boulevard, Olympia, WA 98512-5623, USA.

Fig. 1. Scarey Man® scare device inflated to full height, Mississippi, 1991.

Inspection Serv., Anim. Damage Control, Stoneville, Miss., pers. commun., 1990).

Materials and methods

Device description

The blaze-orange Scarey Man® inflates to its full height (1.7 m), bobs up and down, and emits a high-pitched wail before collapsing to the ground. The unit, inflated by a motorized fan powered by a 12-V marine battery, is operated by a variable timer that permits display at preset intervals from 1–30 minutes. Each display can last 3–30 seconds. A photoelectric sensor turns the device on at daylight and off at dusk. Battery life is 15–21 days under normal operating conditions. These devices cost $555/unit (1991 prices). We used 6 of these devices in our tests.

Test sites

We evaluated Scarey Man® at 4 catfish pond complexes in Mississippi (Table 1) from mid-January through mid-April 1991. In this study, a "complex" was defined as contiguous ponds usually with 1 owner (Christopher 1985). Test sites comprising paired adjacent complexes (except for Site D in which the complexes were separated by 3 km) were selected on the basis of interviews with farm owners or managers. To be included in the test the complexes had to be subjected to enough cormorant feeding to force the owner to have at least 1 person employed half-time for cormorant control.

Most ponds on all complexes contained a range of catfish sizes from fingerlings to market-sized fish, and most complexes contained at least some gizzard shad (*Dorosoma cepedianum*). Site B was unique in that the control and treated complexes were separated by a bayou containing a number of large common baldcypress (*Taxodium distichum*) used as a day roost by cormorants. Test Sites C and D were the first complexes encountered in the morning by cormorants leaving a night roost.

Test methods

During the first 3–5 days of each test (pretreatment periods) we protected both complexes with harassment patrols. These patrols drove through each complex and fired screamer-sirens from a single shot 15-mm pistol launcher (Reed-Joseph Int. Co., P.O. Box 894, Greenville, MS 38702) at cormorants encountered on or attempting to land on the ponds. We drove the route at each test site at 30- to 60-minute intervals during daylight. The number of trips made each day was the same for treated and control complexes at Sites A and C, but was higher on the treated complex at Site B because the route around the treated complex took less driving time than the control complex route and the 2 routes were driven by separate crews. We recorded number of cormorants flushed (excluding birds flying or landing) on each patrol. Except for the test at Site D (see below), harassment patrols were conducted on each complex during the treatment peri-

Table 1. Characteristics of test sites used in evaluations of Scarey Man® in the Mississippi Delta, 1991.

		Pond complex			
Test site	County	Category	Size (ha)	No. ponds	Mean size of ponds (ha)
A	Sharkey	Treated	81	12	6.8
		Control	182	27	6.7
B	Humphreys	Treated	101	21	4.8
		Control	138	27	5.1
C	LeFlore	Treated	84	13	6.5
		Control	57	12	4.8
D	Tunica	Treated	66	11	6.0
		Control	37	4	9.2

ods just as they had been conducted during the pretreatment periods.

We used a split-plot design, with each plot composed of a pair of neighboring catfish complexes in which the treatment (6 Scarey Man® devices) was assigned to the complex having highest cormorant presence based on 3- to 5-day pretreatment counts. Test Site A was an exception because 1 of the complexes was too large to effectively defend with the Scarey Man® devices available (Table 1). In this case, the devices were placed on the smaller complex which had slightly fewer cormorants during pretreatment. In general, after the initial 3- to 5-day pretreatment period, we placed a Scarey Man® on the levee between 2 ponds or at a common junction of 3 or 4 ponds at the rate of 1 device for every 11-14 ha of ponds. We set the devices to display during daylight at 5- to 12-minute intervals and fixed the length of each display between 15 and 30 seconds.

At Test Sites A, B, and C, we added the Scarey Man® treatment to the regular harassment patrols that were conducted as often on the treated areas as on the controls. At Test Site D we tested Scarey Man® without harassment patrols. Instead of patrolling the treated complex, we recorded cormorants flushed from ponds at 1000, 1300, and 1600 for treatment days 1-4 but did not harass the birds. We increased the number of census trips to 4 times/day (at 0800, 1100, 1400, and 1700) for the remainder of the test. On all control complexes during the treatment periods, we conducted the harassment patrols in the same manner as during pretreatment. Catfish complex workers suspended all control efforts during the tests.

We judged the effectiveness of the Scarey Man® device by comparing the mean number of cormorants flushed/day from treated and control areas during pretreatment and treatment. We analyzed differences in cormorant numbers flushed pretreatment versus treatment for all tests by means of a Mann-Whitney U-Test (Hollander and Wolfe 1973).

Results

Cormorant numbers on the treatment ponds decreased 71-99% from pretreatment levels (Site A: $U = 66$ and 39, $n = 11$ and 3, $P = 0.0095$; Site B: $U = 57$ and 34, $n = 10$ and 3, $P = 0.0346$; Site C: $U = 190$ and 110, $n = 19$ and 5, $P = 0.0008$; and Site D: $U = 96$ and 40, $n = 13$ and 3, $P = 0.0105$; Table 2). Although day-to-day fluctuations were evident (Fig. 2), bird numbers on the control areas did not differ between pre- and post-treatment periods at Sites A, C, and D (Site A: $U = 72$ and 33, $n = 11$ and 3, $P = 0.1195$; Site C: $U = 228$ and 72, $n = 19$ and 5, $P = 0.5223$; and Site D: $U = 96$ and 40, $n = 13$ and 3, $P = 0.0596$; Table 2). However, at Site B where $U = 83$ and 8 and $n = 10$ and 3, the number of birds on the control complex was higher ($P = 0.0346$) during treatment than during pretreatment.

Cormorant numbers declined after Scarey Man® devices were placed at Sites A, C, and D (Fig. 2). At Site B the number of cormorants flushed rose slightly the first day of treatment before declining (Fig. 2). At Site A, cormorants flushed on the treatment ponds dropped to 0 by the end of the treatment period, whereas at Sites C and D the number of birds flushed on the treatment ponds remained at low levels. At Site B cormorant numbers on the treatment ponds declined during the first week of Scarey Man® use but then began to recover.

Table 2. Number of census trips and harassment patrols and mean daily number of cormorants (DCCO's) flushed/trip on treated and control catfish complexes, pretreatment and treatment, for each Scarey Man® test, Mississippi, 1991.

Test sites		Pretreatment			Treatment			
		No. census trips	No. DCCO's Mean	No. DCCO's SE	No. census trips	No. DCCO's Mean	No. DCCO's SE	Prob. > Z[a]
A	Treatment	27	157	41	97	2	1	0.01**
	Control	27	175	49	97	96	14	0.12 NS
B	Treatment	41	52	6	137	13	2	0.03*
	Control	26	4	1	82	11	1	0.03#
C	Treatment	85	45	6	269	2	0	0.00**
	Control	87	29	3	269	25	1	0.52 NS
D	Treatment	42	123	12	47	8	1	0.01**
	Control	42	61	8	181	28	2	0.06 NS

[a] Mann-Whitney U-Test; NS (not significant at $P > 0.05$); * (significant at $P \leq 0.05$); ** (significant at $P \leq 0.01$ level); # (control significantly higher [*] during treatment than during pretreatment).

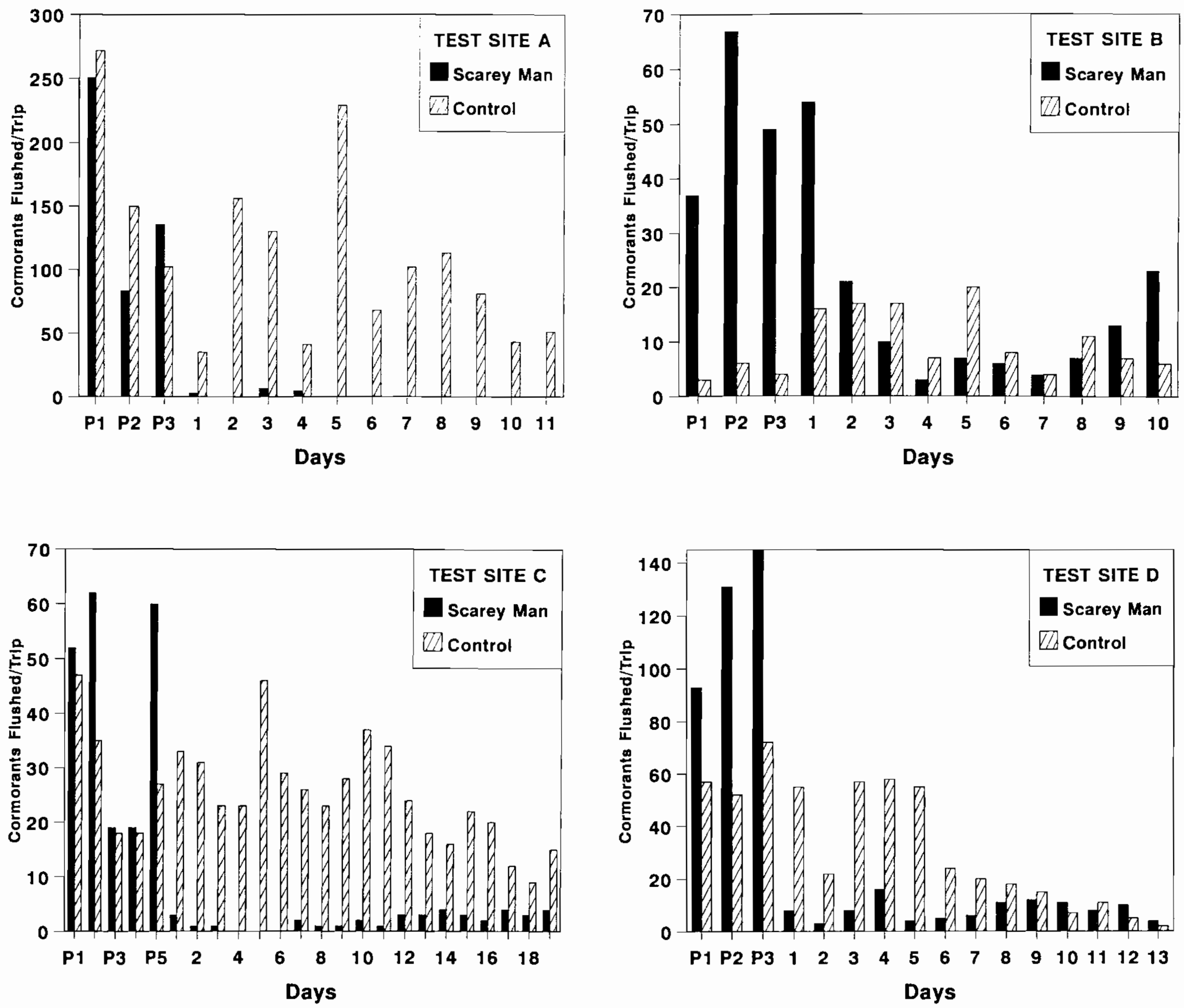

Fig. 2. Cormorants flushed/trip/day for treated and control areas, Test Sites A, B, C, and D, Mississippi, 1991. Prefix "P" indicates pretreatment day.

Discussion

The deployment of Scarey Man® reduced depredating cormorant populations by ≥85% for at least 1 week except at Site B where cormorant use was rapidly increasing and the overall population reduction averaged 71%. Where harassment patrols were continued through the treatment period (Sites A and C) and where cormorants could not dayroost in sight of the ponds, the deterrent effect lasted for at least 2 weeks.

The refractory response of the cormorants at Site B was probably due to the common baldcypress bayou used as a day roost where birds were able to perch in the cypress trees, watch the Scarey Man® devices, and thus habituate to them. At other sites the birds flew out of sight of the ponds when flushed. Bird presence on the treated ponds the latter half of the treatment period at Site D apparently consisted of a small number of cormorants that had habituated to Scarey Man® in the absence of harassment patrols during this particular test.

Signs of cormorant habituation to Scarey Man® at all sites except A, where Scarey Man® was tested for a comparatively short time, were obvious. Winter resident cormorants would unquestionably habituate to the device over time. The more often birds are exposed to a particular visual scare device, the faster the habituation (Inglis 1980). However, a number of ways exist to attenuate the scaring effect at a single complex, especially if the devices are not universally used by farmers. These include moving the devices around the ponds, changing their appearance, replacing them frequently by look-alike shooters, and placing them behind blinds so that they can only be observed by birds on the water when they suddenly inflate (I. R. Inglis, Minist. of Agric., Fish. and Food, Surrey, U.K., pers. commun., 1993).

For these tests the devices were cost-effective. For this discussion, we assume that the pretreatment and treatment periods were the same lengths and the same number of trips were driven during pretreatment and treatment. The total number of cormorants flushed during pretreatment would have been almost 14 times greater (40,239 pretreatment vs. 2,889 treatment) than the number flushed during treatment periods. We assume also that each cormorant counted during pretreatment and treatment had been present on the pond for 12 minutes before being flushed (a modest premise). Stickley et al. (1992) found that cormorants on average consumed 5 catfish fingerlings/hour spent on a pond. Thus, each cormorant could have consumed 1 catfish fingerling before being flushed. At a cost of $0.09 apiece (Stickley et al. 1992), the cost of fingerlings taken pretreatment would have amounted to approximately $3,620/5-day pretreatment compared with a cost of $260 during treatment. The difference of $3,360 approximates the initial cost of the 6 Scarey Man® devices ($3,330). Use of the devices in succeeding years would undoubtedly result in savings exceeding the cost of these devices. If catfish growers conduct nearly continuous harassment patrols to repel cormorants, deployment of Scarey Man® at the rate of 1 device/14 ha of surface water in addition to the regular patrols should be at least temporarily cost-effective in reducing cormorant depredations.

Acknowledgments. We thank the catfish growers and managers who graciously allowed us to work on their farms. These include D. Fisher, J. Griffin, W. Moore, S. Saxton, P. Smith, B. Stark, P. Thornton, and S. Withers. We thank Mississippi Animal Damage Control personnel F. Boyd and B. Sloan for use of their Scarey Man® units, and we appreciate the assistance of R. Royal in providing logistical support for Scarey Man® maintenance. We thank J. Waldrop for helpful advice, S. Hodnett for manuscript formatting, and J. Glahn for field assistance and statistical analysis. M. Avery, J. Glahn, E. Hill, K. Steenhof, and 3 anonymous reviewers provided helpful reviews of the manuscript.

Literature cited

Christopher, M. W. 1985. Wintering waterfowl use of catfish ponds in the Delta Region of Mississippi. M.S. Thesis, Mississippi State Univ., Mississippi State. 166pp.

Feare, C. J. 1988. Cormorants as predators at freshwater fisheries. Inst. Fish. Manage. Annu. Study Course. 18:18-42.

Hollander, M., and D. A. Wolfe. 1973. Nonparametric statistical methods. John Wiley and Sons, New York, N.Y. 503pp.

Inglis, I. R. 1980. Visual bird scarers: an ethological approach. Pages 121-143 *in* E. N. Wright, I. R. Inglis, and C. J. Feare, eds. Bird problems in agriculture. Brit. Crop Prot. Counc., Croydon, London, U.K.

Littauer, G. 1990. Control of bird predation at aquaculture facilities: strategies and cost estimates. Southern Reg. Aquacultural Publ. No. 402. Miss. Coop. Extension Serv., Mississippi State, Miss. 4pp.

Mississippi Cooperative Extension Service. 1991. Status of fish farming in Mississippi, May 1991. For Fish Farmers 91-2. Mississippi State Univ., Mississippi State. 6pp.

Mott, D. F. 1978. Control of wading bird predation at fish-rearing facilities. Pages 131-132 *in* A. Sprunt, J. Ogden, and S. Winckler, eds. Wading Birds, Res. Rep. #7. National Audubon Soc., New York, N.Y.

National Audubon Society. 1970-1987. American Birds, Central Southern Region, 25:754, 26:615; 28:649; 31:339; 32:362; 33:228; 35:307; 36:302; 37:309; 38:212, 325; 40:290; 41:291, 1,445.

Salmon T. P., and F. S. Conte. 1981. Control of bird damage at aquaculture facilities. U.S. Fish and Wildl. Serv. Wildl. Manage. Leafl. 475. 11pp.

Stickley, A. R., and K. J. Andrews. 1989. Survey of Mississippi catfish farmers on means, effort, and costs to repel fish-eating birds from ponds. Proc. East. Wildl. Damage Conf. 4:105-108.

Stickley, A. R., Jr., G. L. Warrick, and J. F. Glahn. 1992. Impact of double-crested cormorant depredations on channel catfish farms. J. World Aquaculture Soc. 14:192-198.

Received 17 May 1993.
Accepted 16 May 1994.
Associate Editor: Steenhof.